NOTES

DECREASE IN STATURE; NOTE ON THE MEDICO-ACTUARIAL MORTALITY INVESTIGATION

Some time ago the writer found it necessary to rearrange certain of the data for stature presented in the volumes embodying the results of the Medico-Actuarial Investigations. One of the points considered was that of the post-maximum change in stature.

Powys and Pearson* have treated this subject with great thoroughness on the basis of measurements of criminals from New South Wales. Goring† has analyzed his own data, painstakingly gathered in the British prisons. The Australian data include both men and women; the British returns are for men only.

For comparison I have abstracted the data for men over 24 years of age and for women over 21 years of age from 221,819 insured men and 136,504 insured women recorded by years of age and inches of stature.‡

These lower limits were selected because the data of Powys and Pearson and of Goring indicate that man attains his maximum stature in the age class 25–29 years. In New South Wales woman attains her maximum stature at about 25 years.

At ages earlier than this, stature is increasing with increasing age. At ages later than this, stature is decreasing with increasing age. The rates of pre-maximum increase due to growth and the rates of post-maximum decrease due to shrinkage are of course very different. Pearson and Lee§ attempted to fit algebraical expressions giving the smoothed values of stature for the whole age-range, but found the result unsatisfactory. The results of Powys, Pearson and Goring are consistent in indicating that from the age of maximum stature to old age the decrease in stature with age is as well described by a straight line as by that portion of any curve of a higher order fitted to the data as a whole.

The equations given by Pearson and Goring are:

For fraudulent British convicts, $s = 68.06 - .0341\ a$
For other British convicts, $s = 65.76 - .0133\ a$
For Australian male convicts, $s = 68.34 - .0337\ a$
For Australian female convicts, $s = 63.61 - .0361\ a$

In man the stature decreases from 0.013 to 0.034 inch per year, in woman 0.036 inch per year; both men and women will decrease about one-third of an inch for each 10 years after the age of maximum stature.

The equations deduced from the medico-actuarial data‖ are as follows:

For men, $s = 68.63 - .0030\ a$
For women, $s = 64.94 - .0197\ a$

These equations are represented by the lines in the diagram. The empirical means

* Powys and Pearson, Biometrika, 1901, vol. 1, pp. 38–49.

† Goring, The English Convict, pp. 191–193, 1913.

‡ Medico-Actuarial Mortality Investigations. Compiled and published by the Association of Life Insurance Medical Directors and the Actuarial Society of America, vol. 1, New York, 1912.

The crudeness of the measurements is frankly admitted by the Committee. Notwithstanding this fact it seems probable that with such large numbers the inaccuracies of the individual measurements will average out, and that the general means will be fairly trustworthy.

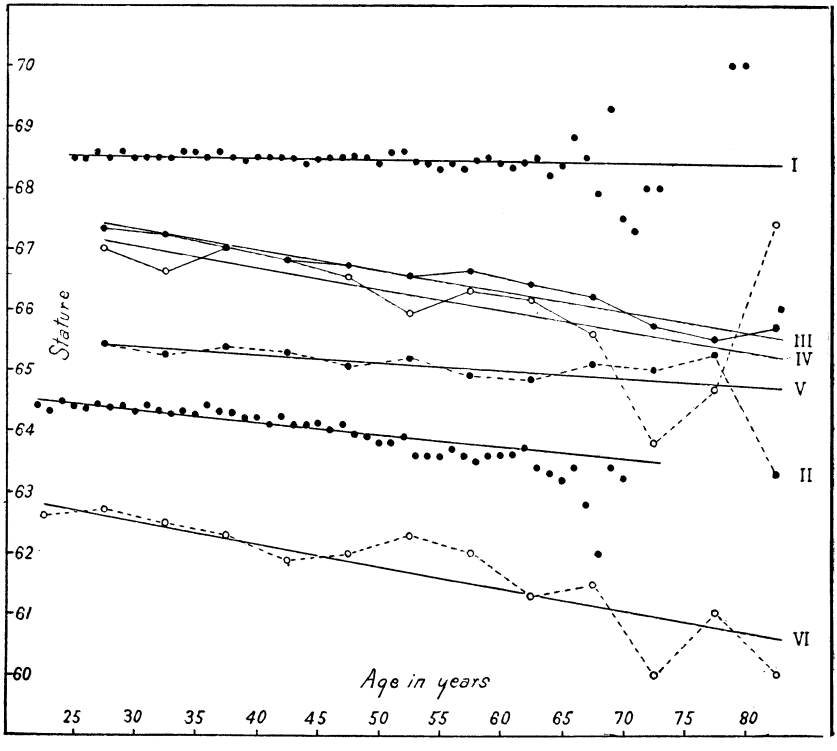
§ In memoir by Powys, Biometrika, 1901, *1*, pp. 48–49.

‖ For men, $N = 182{,}290$, for women, $N = 125{,}016$.

are given for quinquennial age groups for the Australian and British series, but for each year in the medico-actuarial series.

The lines and the empirical means for the American series show a clearly marked post-maximum decrease in the stature of the women. This is somewhat smaller than, but otherwise comparable with that found in the British and Australian series.* In the men, however, the decrease in stature is very slight indeed.

The results for these very diverse series are in fair agreement with the exception of those relating to American men. The crudeness of the measurements has already been



I, American men; II, American women; III, New South Wales male criminals; IV, British fraudulent criminals; V, British convicts other than fraudulent; VI, New South Wales female criminals.

noted. Again, the data are for insured lives and are therefore a selected class. *A priori* there is no reason to assume that men of 60 years who apply for insurance are of the same social class as men of 20 to 30 years. Among the latter there may be a much larger proportion of recent immigrants or of the first generation from immigrant parents, distinctly differentiated in stature from the older American stock. The medical examiners may have a tendency to refuse policies to the older men who show most clearly marked evidences of senile changes.

* The means for the women apparently do not lie in a straight line. It is idle, however, to investigate the point farther on the available data.

In view of these facts, little significance is to be attached to the failure of the men in the medico-actuarial series to show a post-maximum shrinkage comparable with that observed in the criminals who were quite involuntary—not voluntary—applicants for measurement, who were not selected after measurement, and who were measured by experts for purposes of later identification instead of by general medical practitioners.

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SOME LANDMARKS IN THE HISTORY OF VITAL STATISTICS*

In the earlier volumes of the Journal of the Royal Statistical Society—those mines of curious information—a favorite form of contribution was the "tabular résumé," which presented a series of more or less statistical facts on a chronological base. With so distinguished a precedent it has seemed to me that the Quarterly Publications might care to present to its readers a small contribution in the same form, which I have recently drawn up for the use of my students in vital statistics.

This "tabular résumé" attempts to set forth in chronological array what seem to me to be some of the most important landmarks in the history of biostatistics. To disarm in some measure criticisms, which from the standpoint of the professional historian would otherwise be undoubtedly merited, I hasten to say, first, that there has been no slightest thought of encompassing within this short table a complete history of the subject. Historical completeness and the tabular form of presentation do not go well together. The object of the present table is much simpler. It is to get before the student the briefest conspectus of the time relations of the development of the subject on the one hand, and of the personalities concerned in a large path-breaking way in this development, on the other hand. The precise manner in which such an object will be carried out will obviously be different for each person who attempts it. One person's estimate as to the relative historical significance of a particular event or personality will differ from another's. In presenting the matter to my class I endeavor to justify in more detail than is possible in the table itself the particular items which appear. In any event, it seems clear that any historical review of vital statistics would be bound to contain at least a good many of the items of the present table. More than this in the way of agreement among scholars on a historical matter it is doubtless idle to hope for.

In the second place it should be said that if the sources chosen for statement of reference as to the fact are obviously in many cases second-hand, and perhaps somewhat casual, this is so of deliberate purpose. I am hopeful that by so choosing them I may perchance entice an unwary student or so to do a little reading about the men who have helped to develop modern statistics. I am quite sure that this will not happen if I refer him straight off to a ponderous and deadly "Geschichte der Statistik." Nor is there much chance that the embryo health-officer would make anything but very heavy weather if he essayed a voyage into the "*Theorie analytique*." But if he will read the article in the Encyclopedia Britannica on Laplace he will tend to have a measure of wholesome respect for a great man and will know a little at least of what that man meant in the history of science.

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